

CLAIMS

1. A method for producing a wiring substrate provided with bumps protruding from a surface of the substrate, the method comprising the steps of: covering  
5 one side of a metallic base with an electrical insulating film and forming open holes in the insulating film so as to expose at the bottoms thereof the base, etching the base using the insulating film having the open holes formed as a mask to form concavities in the base,  
10 electroplating the interior face of each of the concavities using the base as a plating power supply layer to form a barrier metal film on the interior face of each concavities, filling the concavities with a material for the bump by electroplating using the base as  
15 a plating power supply layer, forming a barrier layer on the surface of the material for the bump filled in each of the concavities using the base as a plating power supply layer, forming a stack of a predetermined number of wiring patterns on the insulating film, the adjacent  
20 wiring patterns in the stack being separated from each other by an intervening insulating layer and being connected to each other through vias formed in the intervening insulating layer, and the wiring patterns being electrically connected to the material for the bump  
25 filled in the concavities, removing the base from the stack of wiring patterns having bumps each having the barrier metal film, and removing the barrier metal film from each of the bumps.

2. The method of claim 1, wherein a large-sized  
30 metallic foil is used as the base, for simultaneous production of a plurality of wiring substrates.

3. The method of claim 2, wherein two metallic bases laminated by joining them by adhering the peripheries thereof are used, and the opposed sides of  
35 the laminate are covered with the electrical insulating film.

4. The method of claim 1, wherein the open holes

are formed in the insulating film so as to have tapered interior faces providing a larger diameter at the opening side rather than at the bottom exposing the base.

5        5.    The method of claim 1, wherein the etching used to etch the base for the formation of the concavities is isotropic, and wherein each of the concavities is formed to have a diameter at the interface with the insulating film, which is larger than the bottom diameter of the hole provided in the insulating film.

10       6.    The method of claim 1, wherein the concavities are filled with the material for the bump in such a manner that the material fully fills the concavity, and partially protrudes into the open hole in the insulating film.

15       7.    The method of claim 1, wherein the base is made of copper.

      8.    The method of claim 7, wherein the base is a foil of copper.

20       9.    The method of claim 1, wherein the base is removed by etching.

      10.   The method of claim 1, wherein the bumps are formed of solder or gold.

      11.   The method of claim 9, wherein the bumps are formed of solder.

25       12.   The method of claim 1, wherein the barrier metal film is formed of nickel or cobalt.

      13.   The method of claim 1, wherein the barrier layer on the surface of the material for bump filled in each concavity is formed of nickel.